

# Impact of Intelligence Quotient (IQ) on Dental Caries amongst Socially Handicapped Orphan Children and Children Living with Their Parents

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## ABSTRACT

**Objective:** To evaluate the IQ and dental caries status of socially deprived orphan children and compare with children living with their parents.

**Study design:** For comparison, 100 children in age-group 7–11 years, were divided in two groups: 50 orphanage children (orphanage-group) and 50 school-going children living with their families were included (home group). Raven's colored progressive matrices test was used to record the intelligence quotient (IQ) and dental caries status of children was recorded using dmft Index.

**Results:** There was statistically significant difference between children with different levels of IQ for both the groups. However, the majority of children who belong to below average IQ score had higher dental caries.

**Conclusion:** Children with better IQ had less dental caries. There was no difference in IQ and DMFT/dmft score between both the genders. The overall DMFT/dmft was high in children living with their parents when compared to orphanage children.

**Keywords:** Dental caries, Intelligence Quotient (IQ), Orphanage, Parented Children, RCPM.

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## INTRODUCTION

Etiology of dental caries includes a combination of biological, environmental, and social influences. Risk accumulation life-course model is the most relevant one for considering the occurrence of dental caries is risk accumulation life-course model.<sup>1</sup> The potential contribution of psychosocial factors in understanding the disease process, as well as in improving caries risk prediction has been illustrated in recent work. Newer and easily applicable prediction methods have gained greater importance as caries prevalence is declining in developed nations and relatively few people now encounter for the majority of the caries experience. Identifying caries occurrence more accurately among individuals will reduce the costs of preventive programs.<sup>2</sup>

Intelligence quotient (IQ) measures distinctive traits of intelligence that each child has. Intelligence is defined by Wechsler as "an individual's ability to adapt and constructively solve problems in the environment." Whereas, IQ is defined as the "Relative intelligence of an individual expressed as a score on a standardized test of intelligence."<sup>3</sup> A person's intellectual level can influence his abilities to learn from various experiences, adapt to new situations, understand and deal with abstract concepts, and use knowledge to manipulate one's environment. In spite of enhancements within the oral health of populations in many countries, global problems still exists. Dental caries, periodontal disease are one of the major public health problems. In dentistry a biopsychosocial model of dental caries is very much relevant because most oral health problems can be prevented through preventive measures.

Intelligence is said to have a major influence on children's understanding of causes and consequences, information and

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instructions.<sup>4</sup> In a dental situation also it may influence their ability to communicate feelings or distress and to behave adequately in the dental situation. Children with low IQ require considerably more time to understand and accept the dental treatment scenario.

High IQ is also more practical than an occasional IQ in lenitive the amount of cooperation throughout dental treatment of youngsters.

Only a very few specific studies describe the dental caries status in orphan children living under institutionalized care in India. As these children are socially deprived, they form a perfect group to study the influence of intelligence on dental caries.<sup>5</sup> A number of studies conducted to find the relationship of dental caries with different IQs show conflicting data. Besides, no study was conducted in institutionalized orphan children.

Lower caries rate in orphanages has been reported which is attributed to a combination of the following factors:

- Institutionalization of living conditions;
- freedom from emotional tension along with sheltered life at the institution;
- proper and routine of diet maintenance.

The psychological aspects of these children have not been explored and compared with children living with their parents.

## MATERIALS AND METHODS

The research was conducted after obtaining permission from the head of the orphanage and written informed parental consent from each participant who is living with their families. For comparison, 100 children of age-group 7–11 years were divided in two groups: 50 orphanage children (orphanage-group) and 50 school-going children living with their families were included (home group).

The selection of children was carried out on the basis of the following criteria:

### Inclusion Criteria

- All inmates (both boys and girls) residing in the orphanage during the study period.
- All school-going children living with their respective family members.
- Children included were free from any mental illness/developmental disorder.
- All the subject selected were free of any systemic diseases, medically fit and healthy.

### Exclusion Criteria

- Children with a history of genetic disease, systemic disorders.
- Children with a history of head and neck trauma or any other neurological illness.
- Any congenital or acquired illness affecting the intelligence capacity of a person.
- History of any systemic illness or any type of hypersensitivity reactions or consumption of antibiotics.
- Children with speech or hearing or visual impairment.

### Estimation of IQ Level

Estimation of IQ status had been checked by using "Raven's Coloured Progressive Matrices" (RCPM) under the guidance of a clinical psychologist in each child aged 7 to 11 years. It is a most acceptable test for measuring cognitive abilities and is largely used to assess the normal function of brain.<sup>6,7</sup> It contains 36 problems divided into three segments such as A, Ab, and B. It is a nonverbal test form; questions were framed in a geometrical pattern, with a section missing. The children need to choose the missing cell from the six given choices and were given a test form and requested to answer every one of the inquiries in the particularly composed answer paper. They were also given 30 minutes time to complete the test as per the test manual's guidelines. The acquired data were changed over into percentile, and the assessment of overall score was graded according to the RCPM manual.

### Clinical Examination

Decayed, Missing, and Filled Teeth (DMFT)/dmft Index was used to record the dental caries status.

### Standardization of Investigator

A clinical psychologist performed the proper scoring and interpretation of the intelligence test. The dentist recorded dental caries status of the participants.

## RESULTS

**Analysis:** Descriptive and analytical statistics were done. The values are expressed in mean and standard deviations and also in percentages. ANOVA and the independent sample t-test tests were used to check differences in mean scores among groups wherever appropriate. The difference in proportions was evaluated by Chi-square test.  $p < 0.05$  was considered statistically significant.

**Software:** SPSS (Statistical Package for Social Sciences) Version 20.1 (IBM Corporation, Chicago, USA)

A total of 100 subjects fulfilling the inclusion criteria were included in the study, 50 each in orphanage and home group. The mean age of the study population of the orphanage-group was  $9.82 \pm 1.40$  and for home group was  $8.72 \pm 1.27$ . There were 25 (50.0%) males and 25 (50.0%) females in each group.

The mean IQ, percentage of IQ score and DMFT between orphanage and home group was compared. It was found that statistically significant difference was present in mean IQ ( $p = 0.022$ ) and percentage of IQ score ( $p = 0.022$ ) between the two groups. The mean IQ score of children living in orphanage ( $23.02 \pm 1.84$ ) was significantly more than those children living in home ( $21.76 \pm 3.34$ ). Similarly, the mean percentage of IQ score of children living in orphanage ( $63.94 \pm 5.12$ ) was significantly more than those children living in home ( $60.44 \pm 9.29$ ). The mean DMFT score of orphanage-group children ( $1.54 \pm 2.09$ ) was lower than those living at home ( $2.52 \pm 3.04$ ), but the difference was not statistically significant (0.064) (Fig. 1).

The children were divided into three categories according to the percentages of IQ score. Those children with percentages of IQ score  $\leq$  25th percentile were considered below average, 25th to 75th percentile were considered average and  $\geq$  75th percentile were considered above average. The orphanage and home group did not show any statistically significant difference in IQ levels ( $p = 0.063$ ) (Fig. 2).

The mean DMFT score among children categorized according to percentages of IQ score was compared. Those children with below average IQ had more caries experience ( $2.81 \pm 2.98$ ) compared to average ( $1.57 \pm 2.48$ ) and above average ( $1.83 \pm 2.17$ ) IQ children, but the difference was not statistically significant ( $p = 0.105$ ) (Table 1).

The mean IQ score and DMFT between genders were compared. It was found that no statistically significant difference was present in mean IQ ( $p = 0.022$ ) and DMFT score ( $p = 0.022$ ) between the gender (Table 2).

## DISCUSSION

IQ is defined as the "Relative intelligence of an individual expressed as a score on standardized test of intelligence."<sup>8</sup> There are various IQ testing scales, such as Stanford–Binet IQ test, Kaufman Tests, Cognitive Assessment System, Differential Ability Scales, Sternberg Triarchic Abilities Test, Turing test, Wechsler Intelligence Scale, and RCPM. RCPM is a nonverbal group of test commonly used in instructive settings. In comparison with other IQ testing scales, this scale was initially created for use in examination into the hereditary and environmental origins of cognitive capacity, typically used in

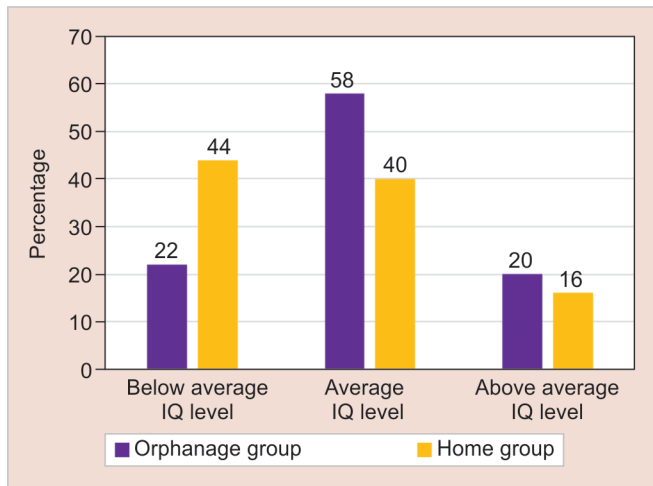


Fig. 1: Comparison of mean IQ, percentage of IQ score and DMFT between orphanage and home group

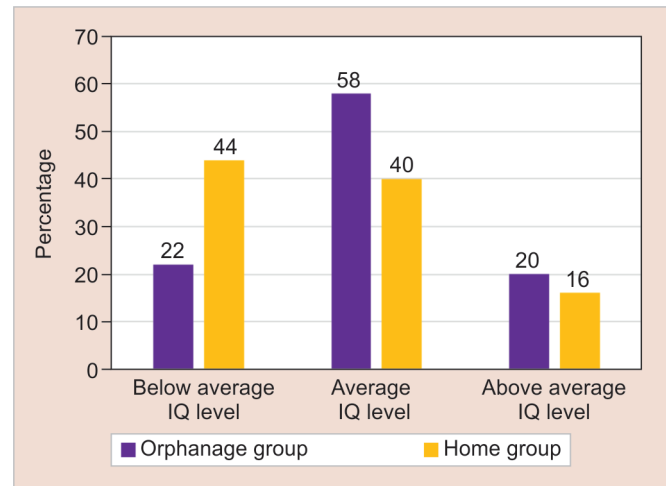


Fig. 2: Comparison of IQ score levels between orphanage and home group

Table 1: Comparison of mean DMFT score among children categorized according to percentages of IQ score

Variables	Male (n = 50)	Female (n = 50)	p-value*
	Mean ± S.D.	Mean ± S.D.	
IQ	22.72 ± 2.60	22.06 ± 2.90	0.234
DMFT	2.16 ± 2.75	1.90 ± 2.54	0.626

\*p > 0.001

Table 2: Comparison of mean IQ score and DMFT between genders

Variables	Male (n = 50)	Female (n = 50)	p-value*
	Mean ± S.D.	Mean ± S.D.	
IQ	22.72 ± 2.60	22.06 ± 2.90	0.234
DMFT	2.16 ± 2.75	1.90 ± 2.54	0.626

\*p > 0.001

educational settings. The matrices are accessible in three distinct structures for the members of various capacities, namely Standard Progressive Matrices, Colored Progressive Matrices, and Advanced Progressive Matrices.

The present study utilizes RCPM, which is designed for normal, mentally, and physically impaired children aged 5–11 years. Test components are organized to evaluate mental improvement up to the phase when a human is adequately ready to reason by correlation with embrace along these lines of reasoning as a predictable strategy for induction. This apparently decisive moment in intellectual development has all the earmarks of being one of the most punctual to decline as the result of organic dysfunction.

The current research helps to decide the thinking ability and perceptions of children with dental caries. This will help the clinician to give more preference to the children who are in need of counseling, which in turn will alter the level of intelligence and will help manage children by understanding their personality level.

There was statistically significant difference present between percentage of IQ score ( $p = 0.022$ ) between the two groups. (58% of orphanage and 40% home children had average IQ level). Whereas, Virk et al., found IQ scores to be less in socially handicapped orphan children<sup>9</sup> whereas high IQ levels were observed in studies conducted by Shankar et al. in 1983<sup>10</sup> and Bruckner and Hill in 1952 in parented children.<sup>11</sup>

The mean DMFT score of orphanage-group children ( $1.54 \pm 2.09$ ) was lower than those living at home ( $2.52 \pm 3.04$ ), though the difference was not statistically significant (0.064). This may be attributed to the fact that children living with their parents has more sugar intake and frequent snacking habits when compared to orphans who had fixed meal timings and less availability of sugary food in their diet pattern.

The results of this study is in accordance with a well believed/ established opinion that institutionalized children are less susceptible to caries attack. On evaluating the distribution of children according to their IQ scores for the two genders, ( $p = 0.022$ ) no statistically significant was observed, however in a study by Navit et al. boys ( $101.7 \pm 11.1$ ) had a higher IQ score when compared to girls ( $99.2 \pm 17.4$ ).<sup>12</sup>

## CONCLUSION

This study was carried out to check the correlation between IQ and dental caries, which revealed that children with better IQ had less dental caries; however, no significant association was observed between the level of intelligence and caries. The overall DMFT/dmft was high in parented children as compared to orphanage children. IQ testing approaches should be incorporated in children's oral health promotion and oral health programs to promote better oral health and better child-clinician relationship.

### Clinical Significance

The results of the present study have demonstrated that children with better IQ had less dental caries which shows that cognitive skills of a child are important for the maintenance of oral hygiene and follow various instructions pertaining to dental treatment. IQ takes into consideration a wide range of cognitive skills, therefore evaluation of IQ by incorporating it in routine clinical examination can help a dentist to estimate the cognition level of the child and thereby implement required treatment modalities accordingly.

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